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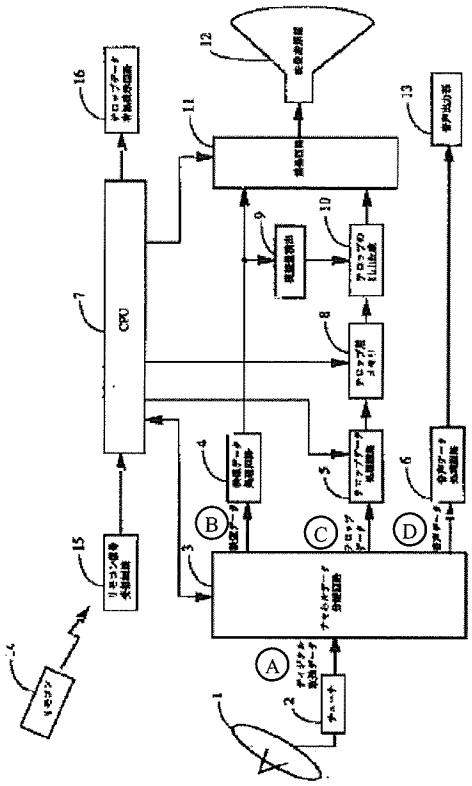
(54) TELOP DISPLAY DEVICE IN DIGITAL STEREOPHONIC BROADCASTING*

* [Editor's note: The Japanese title should say "stereoscopic broadcasting." The text is inconsistent, sometimes using "stereoscopic," sometimes "stereophonic." Although the Japanese Patent Office English title and abstract use "stereoscopic," which is the correct term for the technology being described, this translation has followed the usage in the Japanese original.]

(57) Abstract
Purpose: To provide a telop display device that can display a telop such as an emergency broadcast on a screen during viewing of a stereophonic broadcasting program without damaging the 3-D effect of stereoscopic images.
Solution means: A digital broadcast is received by a tuner 2 via an antenna 1, and video data, telop data, and audio data are separated by a separation circuit 3. If it is determined that telop data exist, a CPU 7 lights a telop data existence display circuit 16, and if a viewer sees this and gives a command from a remote control 14, a video display part 12 that displays stereoscopic images based on images for the right eye and images for the left eye is switched, and telop information to which parallax has been added is displayed on the video display part 12.



Key:

A	Digital broadcasting data
B	Video data
C	Telop data
D	Audio data
2	Tuner
3	Channel data separation circuit
4	Video data processing circuit
5	Telop data processing circuit
6	Audio data processing circuit
8	Memory for telop
9	Parallax quantity detection
10	Telop parallax generation
11	Superimposition circuit
12	Video display part
13	Audio output part
14	Remote control
15	Remote control signal reception circuit
16	Telop data existence display circuit

Claims

1. A telop display device for a digital stereoscopic broadcast, wherein video signals for the right eye and video signals for the left eye are transmitted to display stereoscopic images that sends telop information apart from the above-mentioned stereoscopic images, characterized by the fact that it is equipped with a memory means installed on the receiving end that stores the

above-mentioned telop information; and a display control means that reads the telop information from the above-mentioned memory means according to a request by a viewer and processes and displays it.

2. The telop display device for a digital stereoscopic broadcast of Claim 1, characterized by the fact that the above-mentioned display control means switches and displays the stereoscopic images based on the above-mentioned video signals for the right eye and the left eye and the above-mentioned telop information.

3. The telop display device for a digital stereoscopic broadcast of Claim 1, characterized by the fact that for display, the above-mentioned display control means superimposes the above-mentioned telop information on the stereoscopic images based on the above-mentioned video signals for the right eye and the left eye.

4. The telop display device for a digital stereoscopic broadcast of any of Claims 1-3, characterized by the fact that the above-mentioned display control means includes an indicator display for informing viewers that said telop information is stored in the above-mentioned memory means, and is further equipped with a command means for the viewer commanding display of the above-mentioned telop information after said viewer has seen the above-mentioned indicator display.

Detailed explanation of the invention

[0001]

Technical field of the invention

The present invention pertains to a telop display device for a digital stereoscopic broadcast. In particular, the present invention pertains to a telop display device for displaying characters in a digital stereoscopic broadcast that compresses and transmits video signals for the left eye and the right eye.

[0002]

Prior art

A method exists that divides one frame of a progressive scan (hereinafter, non-interlaced) into two upper and lower blocks by using a digital broadcasting (hereinafter, called a non-interlaced digital broadcasting) system of the 525 [line] progressive scan method and converts two interlaced channels into one non-interlaced channel by inserting images of two fields, that is, two images of an interlaced scan (hereinafter, interlaced) into these respective blocks, and transmits the images. This digital broadcasting system has already been applied for through Japanese Patent Application No. Hei 08[1996]-326721 by this applicant. With the use of this

system, left and right video signals can be transmitted via one transmission line, so that a stereophonic broadcast can be realized.

[0003]

Problems to be solved by the invention

In stereophonic broadcasting by means of the above-mentioned digital stereophonic broadcasting system, if an emergency broadcast telop such as for typhoon information and earthquake information was displayed as stereoscopic information on a screen during viewing of a stereophonic broadcast, adjustment of the amount of parallax for the telop being displayed was difficult, and the 3-D effect of the stereoscopic images was damaged.

[0004]

For these reasons, the main purpose of the present invention is to provide a telop display device for a digital stereoscopic broadcast that can display a telop such as an emergency broadcast on a screen during viewing of a stereophonic broadcasting program without damaging the 3-D effect of the stereoscopic images.

[0005]

Means to solve the problems

According to the invention of Claim 1, for a digital stereoscopic broadcast, wherein video signals for the right eye and video signals for the left eye are transmitted to display stereoscopic images, and that sends telop information, it is equipped with a memory means installed on the receiving end that stores the telop information; and a display control means that reads the telop information from the memory means according to a request by a viewer and processes and displays it.

[0006]

According to the invention of Claim 2, the display control means of Claim 1 switches and displays the stereoscopic images based on the video signals for the right eye and the left eye and the telop information.

[0007]

According to the invention of Claim 3, for display, the display control means of Claim 1 superimposes the telop information on the stereoscopic images based on the video signals for the right eye and the left eye.

[0008]

According to the invention of Claim 4, the display control means of any of Claims 1-3 includes an indicator display for informing viewers that said telop information is stored, and it is further equipped with a command means for commanding display of the telop information after the viewers see the indicator display.

[0009]

Embodiments of the invention

The premise of the present invention will be explained before explaining an embodiment of the present invention. Since a non-interlaced digital broadcast, for example, has been described in detail in "Development of a CS digital broadcasting system for 525 progressive scan signals" (Urano, Sakaguchi, Yamanaka, and Tamura: Nippon Television Network Corporation, Report of Television Society, Feb. 27, 1996), its explanation will be omitted.

[0010]

In a digital broadcast using a CS (communication satellite), a data structure of MPEG-2 transport packets is employed for the transmission of data. In each packet there is a packet identifier called PID (packet identification), and the packet identifier shows the attribute of an individual stream of the corresponding packet. For example, it is assumed that video data of a certain stereophonic broadcasting program is broadcast by PID = 100 and audio data are broadcast by PID = 200. Here, it is assumed that telop information of an emergency broadcast generated in this program is broadcast by PID = 300.

[0011]

Figure 1 is a block diagram showing the constitution of an embodiment of the present invention. In Figure 1, signals from an antenna 1 are sent to a tuner 2, and a channel is selected. Digital broadcasting data demodulated by the tuner 2 are sent to a channel data separation circuit 3. The channel data separation circuit 2[sic; 3] separates the digital broadcasting data into video data, telop data, and audio data according to the PID. The video data are sent to a video data processing circuit 4, the telop data are sent to a telop data processing circuit 5, and the audio data are sent to an audio data processing circuit 6. The video data processing circuit 4 converts the video data into displayable signal formats and displays them on a video display part 12 via a superimposition circuit 11. In addition, the audio data processing circuit 6 converts the audio data into signal formats that can be output by an audio output part 13, and sends them to the audio output part 13.

[0012]

When the telop data processing circuit 5 is controlled by the CPU 7 and telop data are received, the CPU 7 indicates the existence of the telop information by means of a telop information existence display circuit 16. For example, a pilot lamp is lit. The telop data processed by the telop data processing circuit 5 are stored in a telop memory 8. Moreover, the video data processed by the video data processing circuit 4 are sent to a parallax quantity detection circuit 9, and the amount of parallax of the video signals for the left eye and the video signals for the right eye is detected. Parallax is added to the telop information by a telop parallax generation circuit 10 and sent to the superimposition circuit 11. If the existence of the telop data is indicated by the telop data existence display circuit 16, a viewer operates a remote control 14, and its signal is received by a remote control reception circuit 15 and transmitted to the CPU 7. The CPU 7 displays the telop information on a video display part 12 according to this command.

[0013]

Figure 2 shows an operating sequence for displaying the telop data. Figure 3 is a flow chart illustrating the operation of the embodiment of the present invention. Figure 4 explains the relationship between a stereoscopic image and a telop image in the present invention.

[0014]

Next, the detailed operation of the present invention will be explained with reference to Figures 1-4. The CPU 7 implements a program based on the flow chart shown in Figure 3 and determines whether or not telop data have been received. CPU 7 makes this decision based on a signal from the channel data separation circuit 3 showing the separation of telop data that have been sent. If telop data are not received, as shown in Figure 2(a), a stereoscopic image (3D image) is displayed on the video display part 12.

[0015]

When the reception of the telop data is determined, the CPU 7 stores the telop data in the telop memory 8 and lights the telop data existence display circuit 16 as shown in Figure 2(b). The CPU 7 then waits until a telop display command is received from the remote control 14.

[0016]

If the viewer, as shown in Figure 2(c), determines that the telop data existence display circuit 16 has been lit and gives a telop display switching command via the remote control 14, the CPU 7 determines the reception of the telop display command from the remote control 14,

and as shown in Figure 2(d) switches the stereoscopic image to a telop display by means of the superimposition circuit 11. The CPU 7 then turns off the telop data existence display circuit 16.

[0017]

Next, when the telop display is shown, if the viewer operates the remote control 14 again, the CPU 7 switches from the telop display to the stereoscopic image shown in Figure 2(e) by means of superimposition circuit 11.

[0018]

In addition, in the above-mentioned explanation, when the telop display command is given via the remote control 14, the CPU 7 switches the stereoscopic display to the telop display by means of the superimposition circuit 11. The invention is not limited to this, however, and the telop image can be superimposed on the stereoscopic image and displayed.

[0019]

Figure 4 illustrates an example in which a stereoscopic image and a telop display are superimposed and displayed. In the example shown in Figure 4, the screen of the current field is used as an image for the left eye, and the screen two fields before is used as an image for the right eye. In addition, in Figure 4, an image in which a bird flies is used as an example, and a stereoscopic image of mountains in the background is displayed at the back, and the bird is displayed at the front. For this reason, the parallax of the bird flying in front is detected from the stereoscopic image of the background, and the amount of parallax is adjusted so that the image of the bird is positioned to the front. Moreover, in order to display the telop positioned in front of the bird, the amount of parallax of the telop is adjusted. The adjustment of the amount of parallax is made by the telop parallax generation circuit 10 shown in Figure 1.

[0020]

Figures 5 and 6 explain other embodiments of a telop display. In the example shown in Figure 5, an exclusive area 19 for a telop display is provided in a lower area of the video display part 18. In this case, a stereoscopic image is displayed in the video display part 18, and telop data are displayed two-dimensionally (2D) on the area 19 according to viewer request. When the telop data are displayed on the area 19, the stereoscopic image can be continuously displayed on the video display part 18, or the stereoscopic image can be erased.

[0021]

In Figure 6, a dedicated display 20 for displaying telop data is installed separate from the video display part 18. As the indicator display 20, for example, light-emitting diodes, etc., are used. In this example, telop data are displayed according to viewer request, but at this time a stereoscopic image can be continuously displayed on the video display part 18 or can be erased.

[0022]

Effect of the invention

As described above, according to the present invention, telop information is sent separately from video signals for a stereoscopic display, and the telop information is stored at the receiving end. The telop information is read out and displayed according to viewer request. Therefore, a telop such as an emergency broadcast can be displayed while viewing a stereophonic broadcasting program without damaging the 3-D effect of stereoscopic images.

Brief description of the figures

Figure 1 is a block diagram showing the constitution of an embodiment of the present invention.

Figure 2 shows an operating sequence for displaying telop data.

Figure 3 is a flow chart illustrating the operation of the embodiment of the present invention.

Figure 4 explains the relationship between a stereoscopic image and a telop image in the present invention.

Figure 5 shows an example in which an exclusive area for a telop display is provided in a lower area of a video display part.

Figure 6 shows an example in which a dedicated display for displaying telop data is installed separate from a display part for stereoscopic images.

Explanation of symbols

1 Antenna
2 Tuner
3 Channel data separation circuit
4 Video data processing circuit
5 Telop data processing circuit
6 Audio data processing circuit
7 CPU
8 Telop memory

9 Parallax quantity detection circuit
10 Telop parallax generation circuit
11 Superimposition circuit
12 Video display part
13 Audio output part
14 Remote control
15 Remote control signal reception circuit
16 Telop data existence display circuit

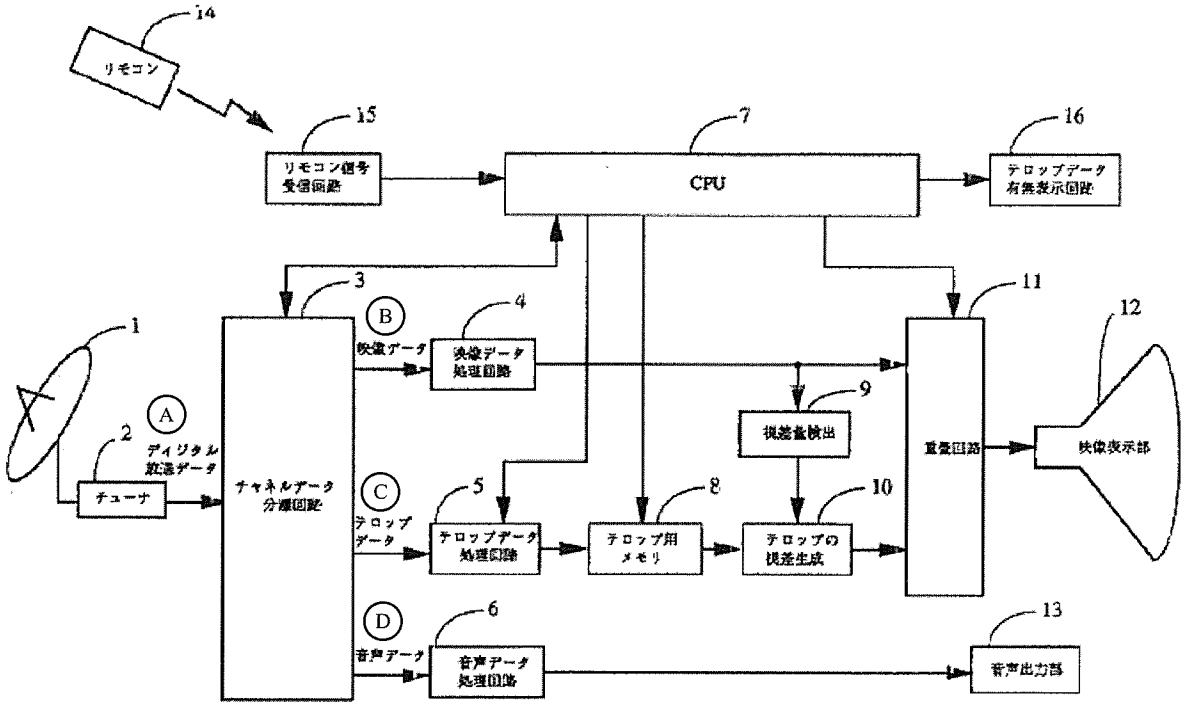


Figure 1

Key: A Digital broadcasting data
B Video data
C Telop data
D Audio data
2 Tuner
3 Channel data separation circuit
4 Video data processing circuit
5 Telop data processing circuit
6 Audio data processing circuit
8 Telop memory
9 Parallax quantity detection

10 Telop parallax generation
11 Superimposition circuit
12 Video display part
13 Audio output part
14 Remote control
15 Remote control signal reception circuit
16 Telop data existence display circuit

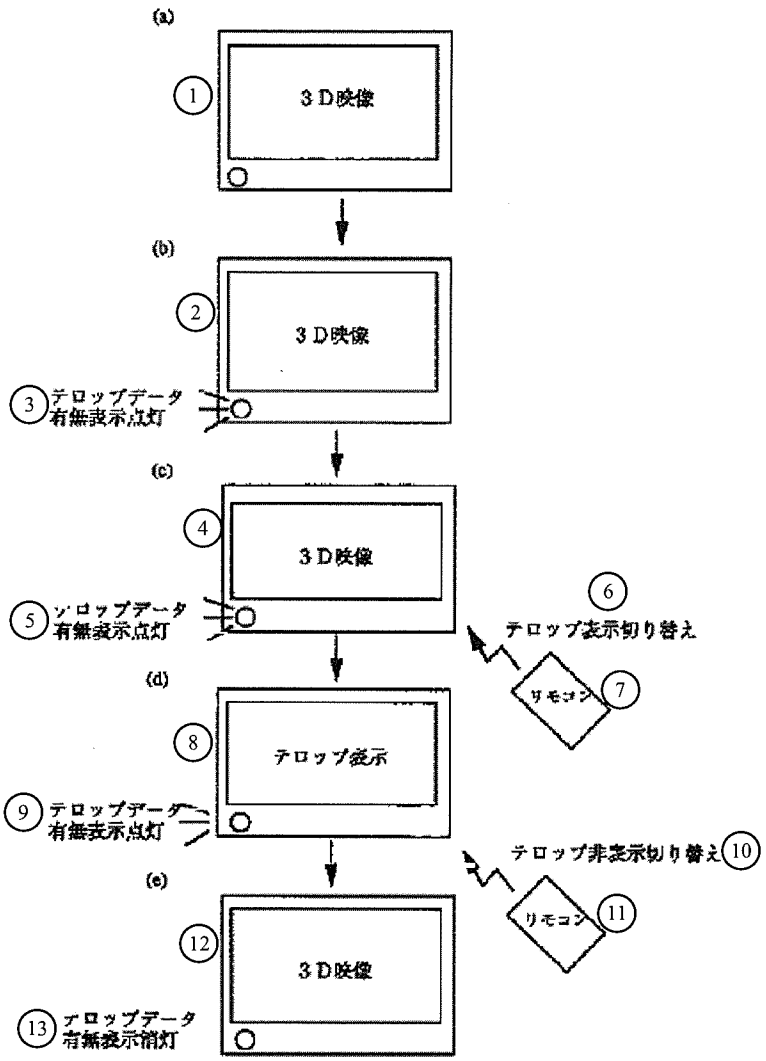


Figure 2

Key: 1 3D image
2 3D image
3 Telop data existence display is lit
4 3D image
5 Telop data existence display is lit
6 Telop display switching

7 Remote control
8 Telop display
9 Telop data existence display is lit
10 Telop non-display switching
11 Remote control
12 3D image
13 Telop data existence display is turned off

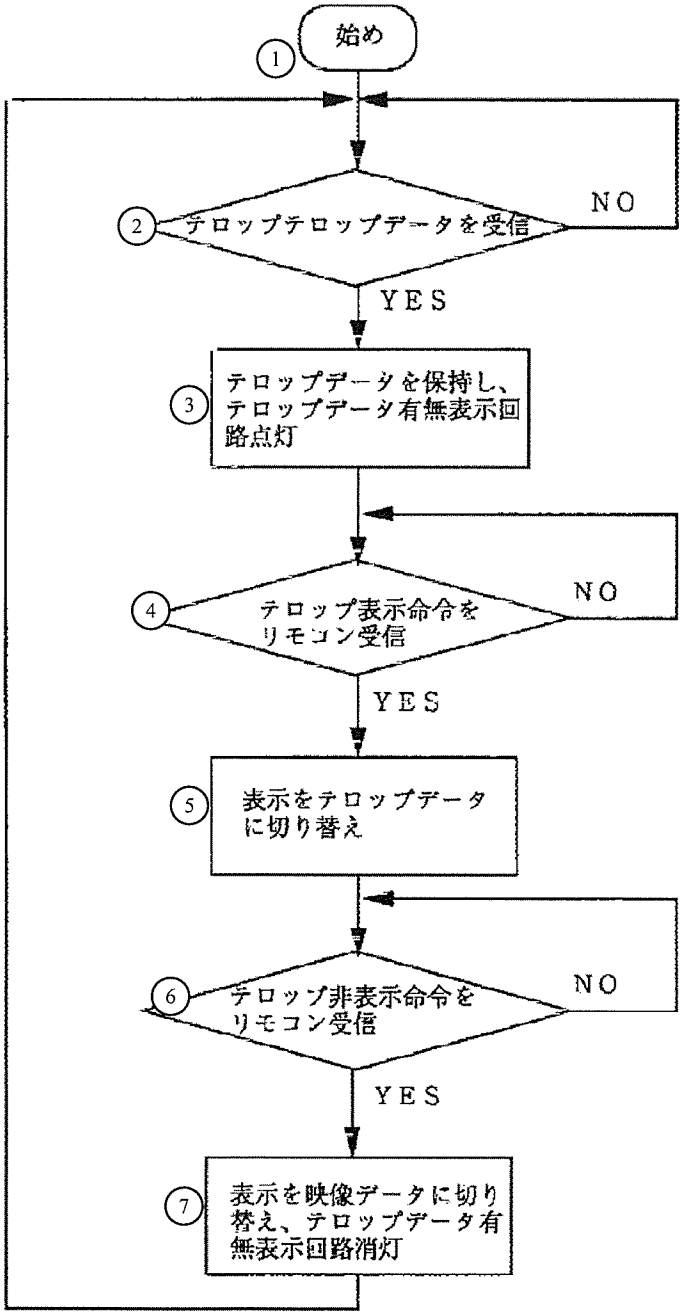


Figure 3

Key: 1 Start
2 Telop data received?
3 Storage of telop data and lighting of telop data existence display circuit
4 Telop display command received from remote control?
5 Switching of the display to the telop data
6 Telop non-display command received from remote control?
7 Switching of the display to the video data, and turning-off of the telop data existence display circuit

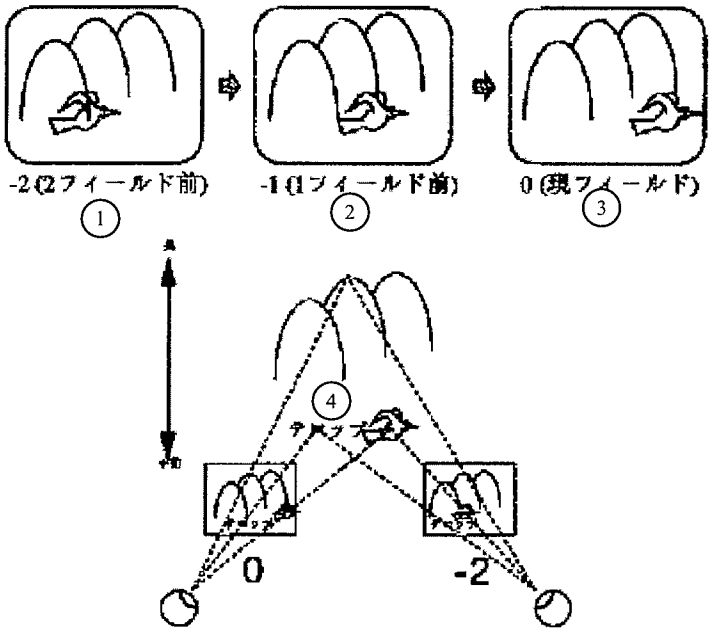


Figure 4

Key: 1 Two fields before
2 One field before
3 Current field
4 Telop

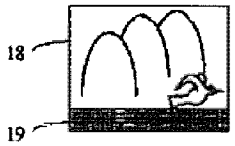


Figure 5

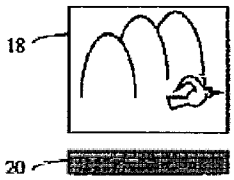


Figure 6